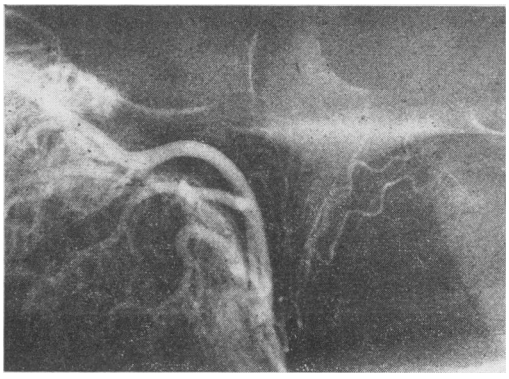

Fig 2 *Main renal branch arteriogram: a pyelogram outlines the renal pelvis, and the small branches to it arising directly from the large artery are clearly shown*

the femoral artery, and advanced into a renal interlobar artery, shows the pattern of segmental perfusion in the dog. Glomeruli are well delineated as dense dots during the arterial phase, and vasa recta are shown a little later, as contrast travels into the medulla (Fig 1). Fine vessels arising directly from the main branch arteries to the renal pelvis and possibly papilla (Moffat & Fourman 1963, Fourman & Moffat 1964) can also be seen *in vivo* (Fig 2). At present the method almost certainly involves partial obstruction of the catheterized vessel, and is therefore unsuitable for physiological studies.

The pattern of renal cortical perfusion during hæmorrhagic shock has also been studied, but using main renal artery injection and measuring renal blood flow by an electromagnetic flow probe placed around the artery (Lavender *et al.* 1969). During progressive hypotension induced by bleeding, there is at first a 'thinning-out' of peripheral cortical perfusion. Thus interlobular arteries stand out more clearly against less dense glomerular background filling. These changes advance, with cortical perfusion retreating from the periphery. They can be reversed to a considerable extent by re-transfusion. Impairment of cortical perfusion may persist for weeks (Kupic & Abrams 1968).

We have frequently observed patchy renal cortical shut-down simply as a consequence of the initial surgical procedure (Sherwood *et al.* 1969). In all satisfactory experiments, however, changes during hæmorrhagic shock have always been remarkably uniform throughout the renal cortex. Our evidence here conflicts sharply with the grossly irregular, patchy pattern of cortical ischæmia described by Carriere *et al.* (1966) and Truniger *et al.* (1966), on the basis of radioactive gas studies followed by autoradiographs.

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Antegrade Pyelography

When excretion urography, retrograde pyelography or ureterography fail to elucidate the cause of a hydronephrosis, antegrade pyelography has often shown the cause.

This technique of injecting contrast medium directly into the calyceal system of a hydronephrotic kidney was first described by Wickbom in 1954. Weens & Florence (1954), and Casey & Goodwin (1955) published their series almost simultaneously.

Technique

With the patient prone, surface markings of lumbar spinous processes and 12th rib are located. A 14 cm lumbar puncture needle is passed vertically downwards through anæsthetized skin 4 finger breadths from the midline and 3 cm below the

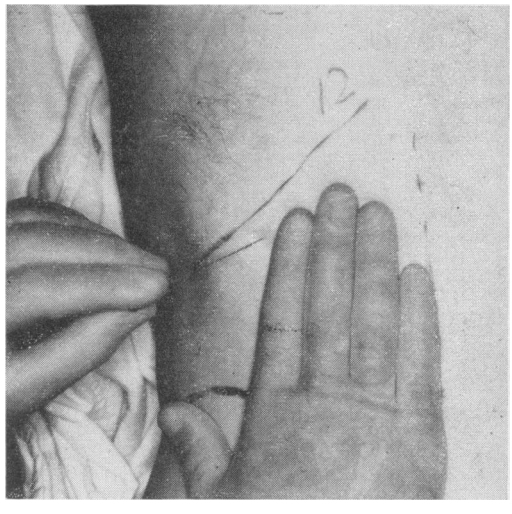

Fig 1 *The anatomical landmarks for injection of contrast medium for antegrade pyelography*

12th rib (Fig 1). It should pass through the renal parenchyma into a dilated calyx and should not be directed towards the dilated renal pelvis, which may tear as the kidney moves on respiration. The renal parenchyma is less likely to tear and forms a seal when the needle is withdrawn. About 60 ml of urine is aspirated and cultured. A lesser quantity of contrast medium (Hypaque 45%) is injected, the needle removed and films taken. If the kidney is visible on a plain film or intravenous pyelogram, preliminary films with markers may help to locate the puncture site.

Complications

There have been no complications requiring treatment in our series. Lundin & Wadström (1965) noticed a rise in temperature of 1°C or more in 29% of their series of 139 cases. Two required emergency surgery, both having been planned for elective procedures on the result of the antegrade pyelogram. Bleeding has not been a problem nor has any urinary fistula been caused.

Indications

When conventional methods fail to reveal the cause of a hydronephrosis, antegrade pyelography should be considered. Infusion pyelography will often show the level of obstruction in hydronephrosis, despite poor renal function, provided sufficient contrast medium is injected and films are taken sometimes many hours after the injection.

Antegrade pyelography will give a better defined picture and is much quicker. Several of our cases have been anuric from ureteric obstruction and in these a quick answer is required.

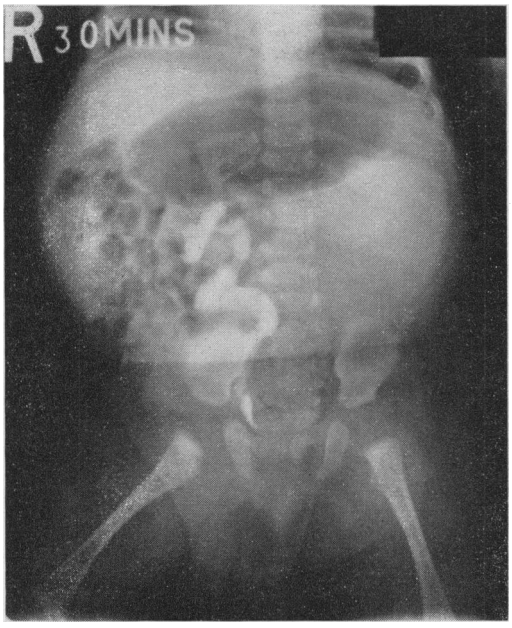

Fig 2 *IVP: left hydronephrosis*

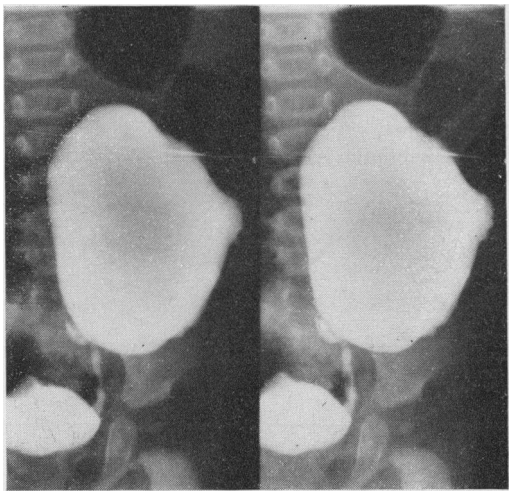

Fig 3 *Antegrade pyelogram. The contrast medium in the bladder remains from the expression cystogram*

Retrograde pyelography and ureterography are both accepted methods for further investigation of hydronephrosis. When cystoscopy is not possible, e.g. due to tight urethral stricture, the catheters cannot be passed and the ureteric orifices visualized; antegrade pyelography may then be used. Hydronephrosis in association with urinary diversion is another indication for antegrade pyelography.

Case Report

The patient was born on March 8, 1969 by forceps delivery in a maternity home. He was transferred to the local general hospital the following day because he would not feed and had a distended abdomen. Plain X-rays were normal, as was the urine. He was soon allowed home but closely supervised by pædiatricians, who were later able to feel a swelling on the left side of the abdomen. Fig 2 is the thirty-minute IVP film showing a dilated right ureter and a large left hydronephrosis. The left ureter could not be seen on any of the films. The right ureter always appeared displaced.

At 4 months he was admitted to the Churchill Hospital for further investigation. Two urine specimens contained no protein or pus cells but grew a heavy mixed growth of coliforms. Both specimens were probably contaminated. The blood urea was 31 mg, hæmoglobin 13·8 g/100 ml, electrolytes normal.

An expression cystogram was performed under general anæsthesia. This showed no reflux so an antegrade pyelogram was performed and showed a large hydronephrosis secondary to a pelvi-ureteric junction obstruction (Fig 3). The aspirated urine was sterile on culture. Two days later an Anderson Hynes pyeloplasty was performed and at operation no extravasation of urine or contrast medium was seen, nor was there any hæmatoma that could be attributed to needling.

This one case from our series shows how useful antegrade pyelography can be. To perform cystoscopy and pass ureteric catheters on this boy would have meant a preliminary perineal urethrotomy, which was avoided by the safe and simple technique recommended in this paper.

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Meeting February 26 1970
with the Renal Association

Obstructive Nephropathy [*Abridged*]

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Functional Abnormalities and Clinical Presentations

Obstructive nephropathy usually means, to the urologist, a problem of surgical pathology and operative technique; to the nephrologist it usually means abnormalities of renal function, particularly of salt and water excretion. The fact that we have a mutual interest in obstructive nephropathy became apparent only after the concepts of renal clearance were established and repeated biochemical measurements were available for the study of a changing clinical state.

Functional abnormalities due to obstructive nephropathy may have the following clinical presentations.

Polyuria with Obstruction

In 1954, Roussak & Oleesky described a syndrome that simulated diabetes insipidus which they called water-losing nephritis. Their second patient, a male, presented with the sudden onset of severe thirst and polyuria. Investigation showed an inability to concentrate urine and an unresponsiveness to antidiuretic hormone (ADH). The blood urea rose only to 57 mg/100 ml and the IVP showed early hydronephrosis. A malignant prostate was excised, and three months later endogenous creatinine clearance, urea clearance and tubular (ADH) function had returned to normal.

In the following year, Morgan *et al.* (1955) reported a similar patient who also presented with thirst and polyuria. The blood urea was 86 mg/100 ml and an IVP showed hydronephrosis. Both thirst and polyuria disappeared after a suprapubic cystostomy and a repeat IVP showed normal upper urinary tracts. Similar patients have since been reported with obstruction due to causes such as idiopathic retroperitoneal fibrosis (Lemmon & Kiser 1966) or ureteric stenosis (Mees 1960).

The occurrence of polyuria with obstruction due to congenital abnormalities has been recorded as an early stage in the course of untreated obstruction (Gross 1953). In a study of 6 male children with congenital obstructions, a one-year-old child had presented with thirst and polyuria and had an ADH-resistant hyposthenuria; there was considerable improvement in function after resection of urethral valves (Ericsson *et al.* 1955). In a similar patient, a 6-month-old boy, the improvement in function was dramatic (Earley 1956). However, the degree of recovery in renal function was much less dramatic in a boy who had had a 9-year history of thirst and polyuria (Winberg 1959) so that recovery may be far from complete if treatment is delayed. In 1966, I presented a similar patient to the Urology Section of this Society:

A boy, then aged 13, had had thirst and polyuria for at least 6 years when his right ureter had been explored for a non-functioning kidney. The daily urine output was never less than 5 litres. He was admitted for assessment of mild uræmia and failure to thrive but after 3 days he rapidly became anuric and uræmic. Retrograde ureteropyelography showed a short narrow stricture in the middle third of the left ureter and this was excised. The renal function has not returned to normal; he has continued to have a polyuria, the blood urea remains at 100 mg/100 ml and there has been only a moderate improvement in the response to ADH.

In summary, these patients present with thirst and polyuria and resemble those described as nephrogenic diabetes insipidus except that they have a detectable obstruction. There is a considerable, if not complete, recovery of renal function after the relief of the obstruction.